11/30/88 Skeeter's Excellent IPM Ips's for PNW Summary - due to cor... Paper suggest: Leaflet ... STATION Paper. Ed

648

DRAFT ONLY

Recommendations for suppression of an Ips perturbatus outbreak in interior Alaska using integrated control

Richard A. Werner[1]

Abstract

Populations of Ips perturbatus (Eichhoff) were reduced in stands of upland white spruce, Picea glauca (Moench) Voss, in interior Alaska using several integrated pest management (IPM) strategies such as conventional and lethal trap trees, baited funnel traps, and preventive and remedial chemical treatments.

Conventional trap trees are large diameter, live spruce which are felled to attract Ips beetles. Trap trees felled at 200-foot intervals prior to and after logging and baited with ipsdienol caught more adult beetles than unbaited trap trees. In addition, unbaited trap trees felled at 100-foot intervals in recently logged stands caught more beetles than decks of 12 or more trees at 400-foot intervals.

Lethal trap trees treated with a silvicide (MSMA) also attracted Ips beetles but were more effective than conventional trap trees in supressing beetle populations because the silvicide retarded the growth and development of new brood. These trap trees attracted more beetles when the trees were baited with ipsdienol.

Lindgren[R] funnel traps that were baited with ipsdienol and placed at 100-foot intervals in recently logged stands and in fringe areas of recently burned stands caught enough beetles to prevent infestation of adjacent live trees.

Introduction

The engraver beetle, Ips perturbatus (Eichhoff), is not usually considered a primary tree killer in interior Alaska, but commonly attacks and colonizes white spruce, Picea glauca (Moench) Voss, trees weakened by fire, periodic flooding, drought, disturbances such as logging, stand thinning, rights-of-way construction, ice and snow damage, and wind. Windthrown trees and logging slash are preferred breeding sites (Holsten and Werner, 1987). In most years, endemic populations of I. perturbatus infest widely scattered individual trees or groups of 10 trees or less, but during warm, dry summers following mild winters, beetle populations increase to such high levels that live, standing trees are infested and killed. The average number of acres infested annually in interior Alaska from 1978 to 1985 was 12,500 ~~± 500~~ acres (Table 1); however, high beetle populations ~~killed~~ 16,000 acres infested of spruce in the Fairbanks area alone in

Table 1. Forest management situations that lead to problems with Ips perturbatus in interior Alaska

Management situation	Acres infested annually
Timber harvest	5,000
Periodic flooding of riverbottom stands	3,000
Post-logging slash and log decks	1,500
Rights-of-way construction	1,000
Windthrow and ice/snow damage	1,000
Post-fire fringe areas	1,000
Total	12,500

1986 and 1987 following a wildfire in 1983 and excessive ice and snow damage in 1985 (Holsten, 1986).

Stands of commercial white spruce adjacent to the wildfire, recently logged and/or thinned areas, and recently constructed logging roads and fire lines were killed during this time; however, several forest management situations contributed to the rapid buildup of beetle populations (Table 1). Decks of spruce and logging slash that remained in logged areas or along road rights-of-way during beetle flight were heavily infested and posed the problem of (1) increasing the population of beetles in the immediate area, and (2) dispersal to uninfested areas during transportation of the logs to the mill.

The rapid buildup and aggressiveness of the beetle population provided the opportunity to test integrated pest management (IPM) and suppression tactics, some of which had been developed in previous years. Recommendations for the use of IPM strategies in the management of I. perturbatus populations in Alaska are reported.

Trap Trees

Ips beetle management strategies included both harvesting freshly attacked trees and the use of felled live trees to act as traps. Trap trees may be of two types: conventional and lethal; the objective is to absorb adult beetles into pre-selected felled trees in order to protect adjacent standing timber. Conventional trap trees should be large diameter, live white spruce which are felled to attract Ips beetles during their flight period from mid-May to early June. The beetle brood in conventional trap trees subsequently must be killed by destroying the tree by debarking, chipping, burning, burying, or chemical treatment to the bark. Lethal trap trees are created by introducing a silvicide into the xylem through an axe frill made around the base of the tree. Two weeks following treatment and absorption of the silvicide, the tree is felled. The silvicide tends to reduce brood development and survival which eliminates the need to destroy the tree or brood as in conventional trap trees.

Table 2. Use of trap trees for managing populations of Ips perturbatus

Type of trap tree	Management situation	Number of trees	Number of baits	Silvicide dosage
Conventional	Pre-logging	1:20 or 1/200 ft intervals	1-2/tree	
Conventional	Log decks	1/100 ft intervals	1-2/tree	
Conventional	Rights-of-way	7-10 logs/deck, decks at 300 ft intervals		
Lethal	Pre-logging	1/200 ft intervals		MSMA (2.8 oz/gal ai) 0.03 oz/inch of circumference
Lethal	Rights-of-way	1/200 ft intervals		Same

The recommended use of trap trees for managing populations of I. perturbatus in Alaska is presented in Table 2. Both conventional and lethal trap trees baited with ipsdienol at 2 m above ground level are recommended for pre- and post-logging situations and road, powerline, seismic line, and pipeline rights-of-way construction. Lethal trap trees should be treated with monosodium methanearsonate (MSMA), an organic arsenical, applied in an axe frill around the circumference of the tree at a dosage of 2.8 oz/gal a.i. at the rate of 0.03 oz per inch of tree circumference at the frill line (Holsten, 1985). In interior Alaska, lethal trap trees should be treated the first week of May and felled two weeks later. Conventional trap trees can be felled in late April.

Both conventional and lethal trap trees can be used within the boundary of timber sales in spruce stands prior to logging in order to reduce the beetle population. These trees should be felled in a grid pattern at 200-ft intervals or one spruce felled for every 20 live standing spruce within a 100-ft radius (figure 1). Trees should be felled in a direction which provides the most shade; they should not be bucked or delimbed.

Semiochemicals

Semiochemicals are message-bearing chemicals that are utilized by I. perturbatus to initiate host selection and mass attack on white spruce. Field-trapping experiments disclosed that ipsdienol, produced by I. perturbatus males, was the most effective pheromone in attracting male and female beetles (author, unpublished results).

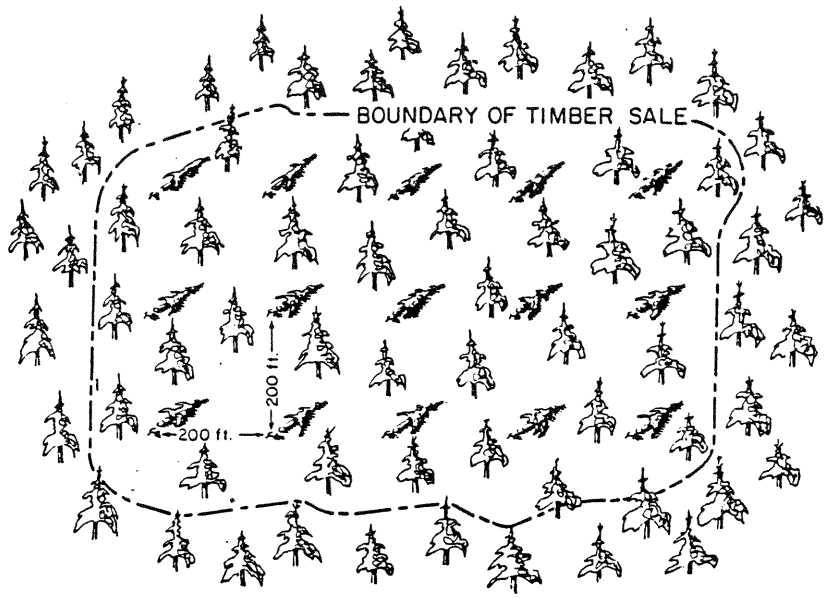

Figure 1. A scheme for reducing populations of Ips perturbatus using conventional or lethal trap trees prior to timber harvest in white spruce stands.

Table 3. Use of semiochemicals for managing populations of Ips perturbatus

Management situation	Type of trapping	Type of trap	Trap interval	Type of bait
Pre-logging	Grid	Lindgren	1/200 ft	Ipsdienol
Post-logging	Barrier	Lindgren	1/100 ft	Ipsdienol
Post-logging	Grid	Lindgren	1/200 ft	Ipsdienol
Log decks	Barrier	Lindgren	1/100 ft	Ipsdienol
Log decks	Barrier	Trap trees	1/100 ft	Ipsdienol
Post-fire	Diversion	Lindgren	1/200 ft	Ipsdienol

A semiochemical bait composed of a slow release formulation of racemic (+)(-) ipsdienol developed by Phero Tech Incorporated, Vancouver, British Columbia is recommended for use in monitoring beetle populations and mass trapping using trap trees or Lindgren funnel traps. The use of semiochemicals for managing populations of I. perturbatus is shown in Table 3. Baiting of conventional and lethal trap trees with ipsdienol prior to and after logging is effective in attracting and reducing the number of beetles in the residual stand (figure 1). Ipsdienol-baited Lindgren funnel traps are recommended in pre- and post-logging situations either as grid trapping for overall suppression of beetles in susceptible areas designated for select harvest or thinning, or as barrier trapping to prevent the movement of beetles from sources of high beetle density or brood material to adjacent uninfested stands (figure 2). Baited funnel traps and baited conventional trap trees can also be used to prevent beetles from infesting log decks or to trap beetles when they emerge from infested decks (figure 2). Funnel traps can also be used in post-fire situations where fire-damaged trees in the fringe area of the fire contain beetles (figure 3). This type of trapping diverts

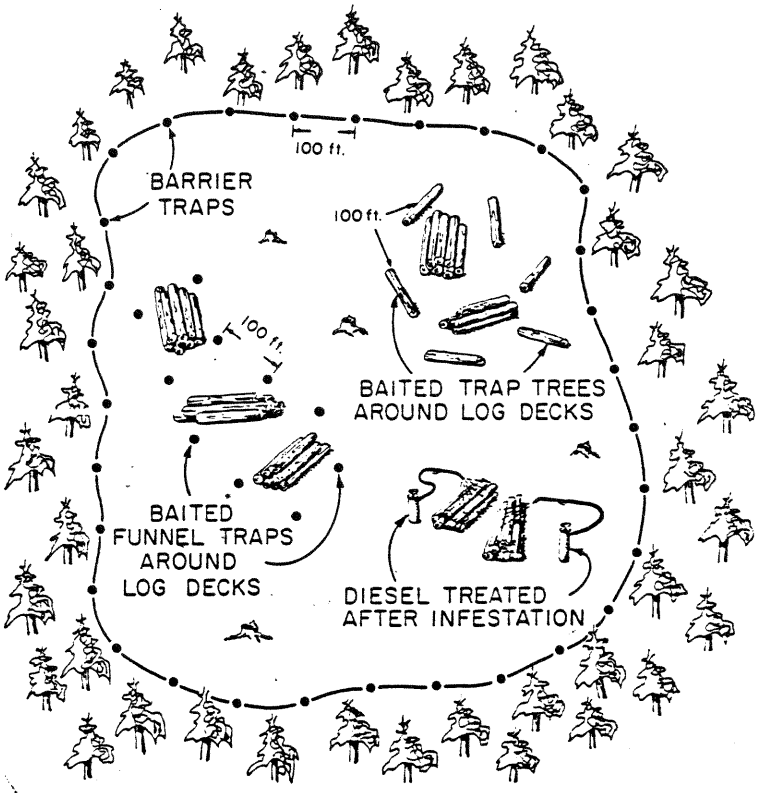

Figure 2. Several methods for reducing populations of Ips perturbatus in stands of white spruce after timber harvest.

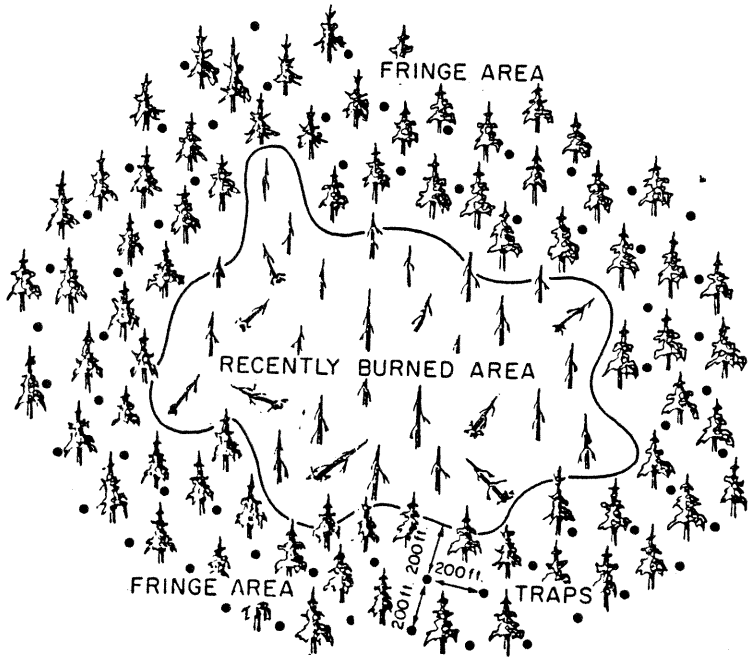

Figure 3. A scheme using diversion trapping to prevent the spread of Ips perturbatus from infested white spruce trees in the fringe area of burned stands into adjacent uninfested stands.

Table 4. Use of chemicals for preventive and remedial control of Ips perturbatus

Management situation	Application	Type of control	Chemical
Pre- and post-logging	Trap trees	Remedial	2% carbaryl
Post-logging	Log decks	Preventive	2% carbaryl or diesel oil
Rights-of-way	Felled trees and log decks	Preventive	2% carbaryl
Campgrounds	High value trees	Preventive	2% carbaryl

beetles from uninfested stands adjacent to recently burned areas. Spacing of traps and trap trees in the above management situations are listed in Table 3.

Chemical Treatment

Chemical treatment of host material is another option in the management of beetle populations. There are two major approaches to using chemical control to reduce beetle populations: 1) remedial control in which infested host material is treated to kill beetles under the bark, and 2) preventive control in which uninfested host material is treated to prevent attacks from beetles. The various types of management situations in which chemical treatment is effective are shown in Table 4. Infested trap trees and log decks can be treated with 2 percent carbaryl applied as an aqueous solution. Uninfested log decks or high-value trees can be protected from attack by beetles by treating with 2 percent carbaryl or diesel oil (figure 3). → caution: at this time, diesel is not "legal" as it is not a registered pesticide

Standing trees should be sprayed to drip point to a height of 40 feet using equipment capable of generating 80 psi of pump pressure. The entire surface of felled trap trees and log decks that can be sprayed should be treated to drip point. Preventive treatments should be applied in early May before the emergence and flight period, whereas, remedial treatments can be applied from late June to late July prior to emergence of the new generation. The use of protective clothing is required and pesticide label directions must be followed. Trees or logs treated with carbaryl should not be burned as fire wood until six months after treatment.

Summary

Suppression of I. perturbatus populations will slow the rate of spread and provide resource managers amble time to implement long-term management plans. Direct control techniques will reduce the populations and

limit the damage during outbreaks but will not alter the conditions which caused the outbreak. Ips beetles will always be present in white spruce stands of interior Alaska and only proper timber management strategies will prevent future outbreaks. IPM strategies using trap trees, funnel traps, and chemical treatments are recommended for suppressing high populations of I. perturbatus. Proper silvicultural prescriptions will maintain the populations at low levels.

References

Holsten, E.H. "Evaluation of monosodium methane arsonate (MSMA) for lethal trap trees in Alaska." U.S. Department of Agriculture, Forest Service, Alaska Region, Technical Report R10-7 (1985).

Holsten, E.H. "Preliminary evaluation of an Ips perturbatus outbreak in the Bonanza Creek Experimental Forest, Fairbanks, Alaska." U.S. Department of Agriculture, Forest Service, Alaska Region, Biological Evaluation R10-86-1 (1986).

Holsten, E.H., and Werner, R.A. "Engraver beetles in Alaska forests." U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, PNW-Leaflet (1987).

Project Leader and Supervisory Research Entomologist, Institute of Northern Forestry, Pacific Northwest Research Station, USDA Forest Service, Fairbanks, Alaska.

Use of proprietary names does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others that may be suitable.

Special thanks goes to Danny Lyon for his assistance in the establishment of research sites and collection of data.